

The actual degree of dryness of each type of waste used will need careful chemical investigation, for it has been found that it has an important bearing on the digestibility of the protein, an important factor in marketing.

Once in the form of a meal, it is ready for compounding into the various feeds. These mixed compounds are then put into a horizontal mixer, steam jacketted, then passed into a pug mill. The face plate of the pug mill is cut so as to permit the dough to pass out in the form of spaghetti, only without a hollow core. This wormlike material passes on to a wire conveyer through a drying or baking oven. On emerging from the oven, the material is broken up to a size of  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in. in length. It is then ready for cooling and packing for transportation to the consumer.

I need hardly point out that much care and experience is necessary in the manufacture of these feeds, for we have to bear in mind that the material we are handling is chemically very delicate, and the slightest mistake in neglecting temperatures, compounding, drying, etc., spells failure in putting out a digestible food. From my own experience I can testify to vast quantities of apparently well-made fish feed products being put on the market with low digestibility and unpalatable to livestock.

There still remains much research to be done on the fish oils, which I am of an opinion can be made extremely valuable. There are many trades calling for good animal oils of this type that, so far as Canada is concerned, are compelled to import for want of manufacture in this country. Besides the necessity for a new source of good animal oil for domestic use, the drug, soap, paint, leather and other trades demand considerable quantities of oil of this nature.

From these remarks it will readily be realized that there is much further work to be done in connection with the fish waste problem: first, a careful survey as to the economic availability of raw material or fish waste; second, as to the most efficient type of plant, both on water and land, and its cost; third, the cost of manufacture of the various feeds and other products; fourth, the organization of the industry so as to save this waste and make some use of it; fifth, the fish fertilizer industry, being so closely allied to the feed industry, should be considered, making use of kelp and other marine products for the manufacture of 'complete fertilizers'.